

TECHNICAL WORK MAY NOT BEGIN PRIOR TO CO APPROVAL

NASA/GODDARD SPACE FLIGHT CENTER

REQUEST FOR TASK PLAN / TASK ORDER

CONTRACTOR	CONTRACT NO./TASK NO.	JOB ORDER NUMBER	APPROP. FY
QSS Group, Inc.	NAS5- 99124 TASK NO. 289 AMENDMENT	975-258-70-13-89	00

TASK TITLE: (NTE 80 characters; include Project name)

ACMR and Correlation Radiometer Calibration Project RF Engineering Services

APPROVALS: (Type or print name and sign)

ASSISTANT TECHNICAL REPRESENTATIVE (OR TASK MONITOR)		DATE	ORG CODE	MAIL CODE	PHONE
Edward J. Kim <i>Edward J. Kim</i>		6/8/00	975	975	301-614-5653
BRANCH HEAD		DATE	CODE	PHONE	
Peter Hildebrand <i>Peter Hildebrand</i>		6/8/00	975	301-614-5737	
CONTRACTING OFFICER'S TECHNICAL REPRESENTATIVE (COTR)		DATE	CODE	PHONE	
Robert S. Lehair, Jr. <i>Robert S. Lehair, Jr.</i>		6/8/00	560	301-286-6588	
FLIGHT HARDWARE, CRITICAL GSE OR SOFTWARE? <small>IF YES, NEED CODE 303 CONCURRENCE NEXT BLOCK</small>		CONTRACTING OFFICER'S QUALITY REP.		DESIGNATED FAM:	
<input checked="" type="checkbox"/> NO <input type="checkbox"/> YES					

The contractor shall identify and explain the reason for any deviations, exceptions, or conditional assumptions taken with respect to this Task Order or to any of the technical requirements of the Task Order Statement of Work and related specifications. The contractor shall complete and submit the required Reps and Certs.

(To be completed by Contracting Officer)

C.O. Requested Quote on:
Date:

Contractor will develop specification or statement of work under this task for a future procurement.	<input checked="" type="checkbox"/> NO <input type="checkbox"/> YES
Flight hardware will be shipped to GSFC for testing prior to final delivery.	<input type="checkbox"/> NO <input type="checkbox"/> YES <input checked="" type="checkbox"/> N/A
Government Furnished Property/Facilities:	<input type="checkbox"/> NO <input checked="" type="checkbox"/> YES - SEE LIST OF GFP (offsite only) / FACILITIES (onsite only)
Onsite Performance:	<input type="checkbox"/> NO <input checked="" type="checkbox"/> YES If yes: <input checked="" type="checkbox"/> TOTAL <input type="checkbox"/> PARTIAL <small>If partial, indicate onsite work in SOW by asterisk (*)</small>
Surveillance Plan Attached:	<input checked="" type="checkbox"/> NO <input type="checkbox"/> YES

Highlighted Contract Clauses: (to be completed by Contracting Officer)

Per Clause H.14, Task Ordering Procedure, subparagraph (f), the effective date of this task order shall be June 8, 2000.

INCENTIVE FEE STRUCTURE (check one)

(See Contract NAS5-99124, Attachment K, Incentive Fee Plan)

	No. 1	No. 2	<input checked="" type="checkbox"/> No. 3	No. 4	No. 5
Cost	10%	50%	25%	25%	%
Schedule	15%	25%	25%	50%	%
Technical	75%	25%	50%	25%	%

(To be completed by Contracting Officer)

The target cost of this task order is \$ 39,156.
 The target fee of this task order is \$ 323.
 The total target cost and target fee of this task order as contemplated by the Incentive Fee clause of this contract is \$ 39,479.
 The maximum fee is \$ 472.
 The minimum fee is \$0.

AUTHORIZED SIGNATURE:

THIS TASK ASSIGNMENT IS ISSUED ACCORDING TO THE CONTRACT CLAUSE "TASK ASSIGNMENTS AND REPORTS"

Elizabeth J. Austin 7/13/00 **ELIZABETH J. AUSTIN**
 SIGNATURE OF CONTRACTING OFFICER DATE TYPED NAME OF CONTRACTING OFFICER

CONTRACTOR'S ACCEPTANCE:

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	NAS5-	TASK NO.	AMENDMENT
QSS Group, Inc.	99124	289	

Applicable paragraphs from contract Statement of Work:

STATEMENT OF WORK: (Continue on blank paper if additional space is required)

See page 3.

PERFORMANCE SPECIFICATIONS:

Monthly Reports and Final Summary Reports as described in the SOW shall contain a summary of activities completed, planned activities for the following month, problems, issues and recommended actions. Report shall be provided to the ATR via email at Edward.J.Kim.1@gsfc.nasa.gov.

APPLICABLE DOCUMENTS:

None.

TASK END DATE: 9/30/00

MILESTONES/DELIVERABLES AND DATES:

See page 5.

PERFORMANCE STANDARDS:

Schedule: On-time delivery/completion of the deliverables/milestones
Technical: ATR's acceptance of the deliverables

FINAL DELIVERY DESTINATION (NAME, BLDG, ROOM):

Edward J. Kim, building 33, room A426

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Contract NAS5-99124

STATEMENT OF WORK:Task #: **289**

**RADIO FREQUENCY (RF) ENGINEERING SERVICES
for the
AIRBORNE C-BAND MICROWAVE RADIOMETER (ACMR)
and the
CORRELATION RADIOMETER CALIBRATION PROJECT**

SCOPE OF WORK

The Contractor shall provide the personnel necessary to support the radio frequency (RF) engineering efforts described below, including hardware and software engineering services, for two microwave radiometer projects: "ACMR Polarimetric Upgrades and Field Tests" and the "Correlation Radiometer Calibration project."

STATEMENT OF WORK

The Contractor shall provide services as defined in the following subtask statements.

Subtask 1: ACMR Polarimetric Upgrades and Field Tests

The Contractor shall provide RF engineering personnel to support the government in the construction, documentation, and testing of Airborne C-Band Microwave Radiometer (ACMR) instrument upgrades. ACMR is currently a dual-polarized instrument (vertical and horizontal). The polarimetric upgrades will add the capability to measure in-phase and quadrature time-correlations of the vertical and horizontal signals, for a total of four outputs. These new outputs must be calibrated along with the original output signals. The responsibilities of the Contractor may include:

- a) Low-level design, construction, and testing of polarimetric RF hardware for the ACMR instrument. This hardware will include C-band (6.8 GHz) RF components (phase shifters, oscillators, splitters/combiners, attenuators, amplifiers, isolators, antenna, etc.); low-noise mixers to downconvert signals from 6.8 GHz to an intermediate frequency (IF) below 1.5 GHz; IF components (phase shifters, filters, splitters/combiners, attenuators, and amplifiers, etc.); associated power supplies and mechanical layout, temperature sensors, and temperature control components. Tests will consist of standard RF/microwave measurements including: gain or loss, phase, noise temperature, frequency, power, isolation, VSWR, impedance, temperature, stability, etc.
- b) Low-level design, construction, and testing of correlator hardware and software for the ACMR instrument. This hardware will include high-speed (up to 2 Gb/s) digital circuitry plus associated power supplies and mechanical layout, temperature sensors, and temperature control components. The software shall include computer programs needed to operate this hardware.
- c) Low-level design, construction, and testing of calibration targets for the ACMR instrument. This hardware will consist of RF absorber material enclosed in Styrofoam or

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- other thermally-insulating containers, along with embedded temperature sensors. Testing will involve standard hot/cold radiometer calibration methodology.
- d) Assist with field deployment and field testing of the ACMR instrument, including: loading/unloading equipment onto a truck; driving a small truck to/from a field site; set-up and take-down of ACMR and test equipment at a field site (grass field, farm field, forest, or parking lot); operating ACMR; performing calibrations.
 - e) Compilation of day-to-day construction documentation and test records. Finished block diagrams, circuit schematics, wiring diagrams, mechanical sketches, test result summaries, and operating procedures at the conclusion of the subtask.
 - f) Assist with ACMR data processing and analysis (computer programming and preparation of graphs, charts, and tables in Fortran, C, Matlab, or IDL).

Subtask 2: Correlation Radiometers Calibration Project

The Contractor shall provide RF engineering personnel to support the government in the design, development, construction, and testing of a prototype calibration subsystem for correlation microwave radiometers. Correlation microwave radiometers operate by measuring the correlation (in phase and quadrature) of the outputs from a pair of normal non-correlation radiometers. For space applications, on-board calibration is a critical but difficult problem. This project is intended to develop a laboratory prototype calibration system, and eventually (beyond the scope of this Subtask) to develop a low-power, low-mass version for future flight projects.

The responsibilities of the Contractor may include:

- a) Low-level design, construction, and testing of a pair of X-band correlation radiometer receivers. This hardware will include X-band (10.7 GHz) RF components (phase shifters, oscillators, splitters/combiners, attenuators, amplifiers, isolators, antenna, etc.); low-noise mixers to downconvert signals from 10.7 GHz to an intermediate frequency (IF) below 1.5 GHz; IF components (phase shifters, filters, splitters/combiners, attenuators, and amplifiers, etc.); associated power supplies and mechanical layout, temperature sensors, and temperature control components. Tests will consist of standard RF/microwave measurements including: gain or loss, phase, noise temperature, frequency, power, isolation, VSWR, impedance, temperature, stability, etc.
- b) Assist with low-level design, construction, and testing of hardware and software for a prototype controlled-correlation source subsystem. This hardware will include components as in Subtask 2 (a) plus baseband high-speed (0 up to 1 Gb/s) digital circuitry plus associated power supplies and mechanical layout, temperature sensors, and temperature control components. The software shall include computer programs needed to operate this hardware. Tests will consist of standard RF/microwave measurements including: gain or loss, phase, noise temperature, frequency, power, isolation, VSWR, impedance, temperature, stability, etc.

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- c) Construction and testing of a high-speed digital correlator subsystem. This hardware will include high-speed (up to 2 Gb/s) digital circuitry plus associated power supplies and mechanical layout, temperature sensors, and temperature control components. The software shall include computer programs needed to operate this hardware.
- d) Writing and debugging of computer programs needed to conduct the above tests. Analysis of test results (computer programming and preparation of graphs, charts, and tables in Fortran, C, Matlab, or IDL).
- e) Compilation of day-to-day construction documentation and test records. Finished block diagrams, circuit schematics, wiring diagrams, mechanical sketches, test result summaries, and operating procedures at the conclusion of the subtask.
- f) Assist with low-level design, construction, and testing of a prototype high-speed (at least 200 Mb/s, possibly 10 Gb/s) fiber optic data link.

MILESTONES/DELIVERABLES AND DATES

The contractor shall provide the following deliverables in accordance with the schedule shown below.

- 1) The Contractor shall provide to the ATR a final summary set of hardware and software documentation and operating instructions (in electronic form & one hardcopy) derived from Subtask 1(e) by the end of the period of performance.
- 2) The Contractor shall provide to the ATR a final summary set of hardware and software documentation (in electronic form & one hardcopy) derived from Subtask 2(e) by the end of the period of performance.
- 3) The Contractor shall provide a Monthly Progress Report covering both subtasks. The report shall list completed hardware and software construction and testing, as well as problems and plans. The Report is due the 5th of the month reporting on the previous month's activities.

If delays related to procurement of materials or test equipment or delays due to changes in the customer's schedule occur, the period of performance may be extended, but the Contractor will not be liable for these delays. The contractor would temporarily cease work until the delay is resolved.

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PLACE OF PERFORMANCE

This effort requires that Contractor personnel work at the customer site (NASA/GSFC, Greenbelt, MD). Travel may be required in support of activities associated with this effort dependent upon the field test schedule. One 3-day trip from Greenbelt, MD to Ann Arbor, MI is anticipated. The field test schedule may require this trip to include a Saturday and/or a Sunday.